The African Organisation for Standardisation

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Second Edition 2012

Milled maize products — Specification

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Foreword

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This African Standard was prepared by the ARSO Technical Harmonization Committee on Agriculture and Food Products (ARSO/THC 1).

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Introduction

This African Standard stipulates the grading and quality requirements for milled maize products destined for human consumption. During the preparation of this standard, some amendments have been made on the definitions of different maize meal products. The microbiological requirements for dry milled maize products have been incorporated in an endeavour to safeguard the health and safety of consumers of these products.

The scope of this African Standard has been expanded to cover sifted maize meal, granulated maize meal, maize flour and whole maize meal as opposed to covering only whole maize meal which was the case in the previous edition.

This African Standard is a technical revision of the earlier ARS 466:1987(E), *Whole maize meal — Specification* which is hereby superseded and cancelled.

Milled maize products — Specification

1 Scope

This African Standard specifies the requirements and methods of sampling and testing for milled maize (corn) products intended for human consumption.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ARS 461, *Maize grains — Specification*

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

ARS 471, *Food grade salt — Specification*

CODEX Stan 192, *General standard for food additives*

CODEX STAN 193, *Codex general standard for contaminants and toxins in food and feed*

ISO 660, *Animal and vegetable fats and oils — Determination of acid value and acidity*

ISO 711, *Cereals and cereal products — Determination of moisture content (Basic reference method)*

ISO 712, *Cereals and cereal products — Determination of moisture content — Routine reference method*

ISO 1871, *Food and feed products — General guidelines for the determination of nitrogen by the Kjeldahl method*

ISO 2171, *Determination of ash content*

ISO 2591-1, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*

ISO 4832, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony-count technique*

ISO 4833, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Colony-count technique at 30 degrees C*

ISO 5498, *Agricultural food products — Determination crude fibre content — General method*

ISO 5985, *Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid*

ISO 6579, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Salmonella* spp.

ISO 6888-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 1: Technique using Baird-Parker agar medium*

ISO 6888-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 2: Technique using rabbit plasma fibrinogen agar medium*

ISO 6888-3, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 3: Detection and MPN technique for low numbers*

ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

ISO 7932, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of presumptive* Bacillus cereus *— Colony-count technique at 30 degrees C*

ISO 9526, *Fruits, vegetables and derived products — Determination of iron content by flame atomic absorption spectrometry*

ISO 11085, *Cereals, cereals-based products and animal feeding stuffs — Determination of crude fat and total fat content by the Randall extraction method*

ISO 13690, *Cereals, pulses and milled products — Sampling of static batches*

ISO 16050, *Foodstuffs — Determination of aflatoxin B_1, and the total content of aflatoxins B_1, B_2, G_1 and G_2 in cereals, nuts and derived products — High-performance liquid chromatographic method*

ISO 21527-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 2: Colony count technique in products with water activity less than or equal to 0.95*

ISO/TS 21872-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of potentially enteropathogenic Vibrio spp. — Part 1: Detection of Vibrio parahaemolyticus and Vibrio cholerae*

ISO/TS 21872-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of potentially enteropathogenic Vibrio spp. — Part 2: Detection of species other than Vibrio parahaemolyticus and Vibrio cholerae*

AOAC Official Method 2001.04, *Determination of Fumonisins B_1 and B_2 in corn and corn flakes — Liquid chromatography with immunoaffinity column cleanup*

3 Definitions

For the purpose of this standard the following definitions apply.

3.1
whole maize meal
product obtained by grinding clean whole maize kernel by the use of mill or other grinding methods excluding roller *milling*

3.2
granulated maize meal
the product obtained by roller milling and sifting of shelled clean maize and complying with requirements indicated in Table 1

3.3
sifted maize meal
the product obtained by roller milling and sifting shelled clear maize and complying with the requirements Indicated in Table 1

3.4
sifting
the particle size separation by sieving and aspiration of roll-milled products

3.5
cleaned maize
the shelled maize that shall have been subjected to a cleaning process for the removal of foreign and objectionable matter originally present

3.6
maize flour
product obtained by removing the germ and bran followed by grinding, clean maize kernels using roller mills or other methods and sifting the resulting product to suitable degree of fineness.

4 Quality requirements

4.1 Raw materials

Maize meal shall be made from shelled maize conforming to the requirements given in ARS 461.

4.2 General requirements

4.2.1 Maize meal shall be of natural colour conforming to the colour of maize from which it was prepared.

4.2.2 Maize meal shall not contain any foreign matter such as insects, fungi, dirt or other contaminants above the level permitted in ARS 461.

4.2.2 Maize meal shall be free from fermented musty or other objectionable colours.

4.2.3 Maize meal shall be free from rancidity and foreign odours.

4.2.4 Maize meal shall be wholesome and fit for human consumption in all aspects.

4.3 Specific requirements

Milled Maize products shall conform to the requirements given in Table 1.

Table 1 — Specific requirements

S/No.	Characteristic	Type				
		Sifted maize meal	Granulated maize meal	Whole maize meal	Maize flour	Test method
i)	Fibre content, % by m/m, max.	0.7	1.0	3.0	0.7	ISO 5498
ii)	Crude fat on a moisture free basis, % by m/m, max.	2.25	2.25	3.1		ISO 11085
iii)	Moisture content, % by m/m, max.	14	14	14	14	ISO 711/ ISO 712
iv)	Total ash, % by m/m, max.	1.0	1.0	3.0	1.0	ISO 2171
v)	Acid insoluble ash, % by m/m, max.	0.15	0.35	0.40	0.15	ISO 5985
vi)	Crude protein (N x 6.25) % min	7.0	7.0	8.0	7.0	ISO 1871
vii)	Iron mg/kg	7	7	8	8	ISO 9526
viii)	Fat acidity, mg KOH per 100g of product, on dry mass basis	50	50	50	50	ISO 660
ix)	Total Aflatoxin (AFB1+AFB2+AFG1 +AFG2)), ppb max	10				ISO 16050
x)	Aflatoxin B1 only, ppb max	5				
xi)	Fumonisin ppm max	2				AOAC Official Method 2001.04

5 Food additives

5.1 The product shall contain only permitted additives complying with CODEX STAN 192.

6 Hygiene

6.1 Milled maize products shall be produced, prepared and handled in accordance with the provisions of appropriate sections of ARS 53.

6.2 When tested by appropriate methods of sampling and examination, the product:

— shall be free from microorganisms in amounts which may represent a hazard to health;

— shall be free from parasites which may represent a hazard to health; and

— shall not contain any substance originating from microorganisms in amounts which may represent a hazard to health.

6.3 The product shall be free from pathogenic micro-organism and shall comply with microbiological limits in Table 2.

Table 2 — Microbiological limits

S/N	Micro-organism(s)	Requirements	Method of test
1	Total plate count, cfu/g	10^5	ISO 4833
2	*Staphylococcus aureus* cfu/g max	10^2	ISO 6888
3	*Escherichia coli,* cfu/g, max.	absent	ISO 7251
4	*Salmonella*, per 25g, max.	absent	ISO 6579
5	*Coliforms* g (per 100 g)	absent	ISO 4832
6	Bacillus cereus, per 25g, max.	absent	ISO 7932
7	Yeasts and moulds, cfu/g, max.	10^3	ISO 21527-2
8	*Vibrio cholerae*	absent	ISO/TS 21872

7 Contaminants

7.1 Heavy metals

Milled maize products shall comply with those maximum limits for heavy metals established by the Codex Alimentarius Commission for this commodity.

7.2 Pesticide residues

Milled maize products shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

7.3 Mycotoxins

Milled maize products shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity. The milled maize products shall not exceed total aflatoxin of 10 ppb and 5 ppb for aflatoxin B1 when tested in accordance with ISO 16050.

8 Packaging

8.1 Maize meal shall be packed suitable packages which shall be clean, sound, free from insects, fungal infestation and the packing material shall be of food grade quality.

8.2 Maize meal shall be packed in containers which will safeguard the hygienic, nutritional, technological and organoleptic qualities of the products.

8.3 The containers, including packaging material, shall be made of materials which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odour or flavour to the product.

8.4 Each package shall be securely closed and sealed.

9 Labelling

In addition to the requirements ARS 56, each package shall be legibly and indelibly marked with the following:

i) name of product as "Whole Maize Meal, Sifted Maize meal, Maize flour or Granulated Maize meal";

iii) name and address of the manufacturer/packer/importer;

iv) brand name/registered trade mark;

v) batch or code number;

vi) net weight in metric units;

vii) the statement “Store in a Cool Dry Place";

viii) the statement "Human Food";

x) country of origin;

xi) date of manufacture;

xii) expiry date;

xiii) instructions for disposal of used package.

10 Methods of sampling

Sampling shall be done in accordance with the ISO 13690.

Annex A
(normative)

Determination of acid insoluble ash

A.1 Reagent

A.1.1 Dilute Hydrochloric Acid — 1:1, prepared from concentrated hydrochloric acid.

A.2 Procedure

A.2.1 Weigh accurately about 2 g of the dried material in a tared porcelain, silica or platinum dish. Ignite with a meker burner for about 1 hour. Complete the Ignition by keeping in a muffle furnace at 500 °C to 570 °C until grey ash results.

Cool and filter through whatman filter paper No. 42 or its equivalent. Wash the residue with hot water until the washings are free from chlorides as tested with silver nitrate solution and return the filter paper and residue to the dish. Keep it in an electric air oven maintained at 135 ± 2 °C for about 3 hrs. Ignite the dish again for about 30 minutes, cool and weigh. Repeat this process till the difference between two successive weighings is less than 1 mg. Note the lowest weight.

A.3 Calculation

A.3.1 Acid insoluble ash, per cent by weight

$$= \frac{100(M_2 - M)}{M_1 - M}$$

where,

M_2 = the lowest weight, in g, of the dish with the acid insoluble ash;

M = weight, in g, of the empty dish; and

M_1 = weight, in g, of the dish with the dried product taken for the test.

Bibliography

EAS 44:2011, *Milled maize (corn) products — Specification*

CODEX STAN 154:1985(Rev.1:1995), *Standard for Whole Maize (Corn) Meal*